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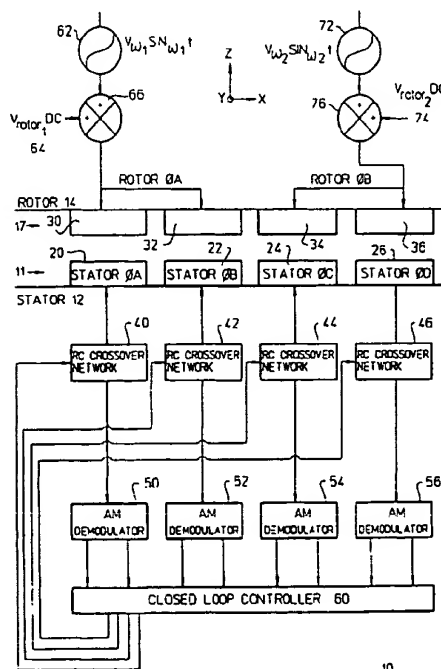
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(54) Electrostatic actuator

(57) An electrostatic actuator (10) uses two-dimensional in-plane motion of a monolithic element suspended by flexures which is unstable in the open-loop and uses feedback control to operate. By adding a common bias voltage to each of the stator electrodes (20, 22, 24, 26) when the translator (14) and stator (12) are in the unstable equilibrium position, repulsion can be reduced to zero while the in-plane force remains in unstable equilibrium. Stabilizing the in-plane force at the unstable equilibrium position is achieved by shifting the electrical phase of the stator potential distribution in a direction to produce an in-plane force which opposes motion of the translators away from equilibrium position. Linear control and pulse width modulation control permit altering the phase by less than the stator pitch. The drive electrodes of the translator and stator are used as position sensors for in-plane and out-of-plane relative displacements of the translator and stator concurrent with operation of the motor using either pulse-width modulation or linear control.

**Figure 1****EP 0 911 952 A3**



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EUROPEAN SEARCH REPORT

Application Number
EP 98 30 8766

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			H02N
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 February 2000	Examiner Ramos, H
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document</p> <p>T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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